

# Determinants of Stock Price Synchronicity



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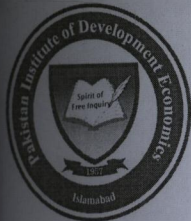
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# PAKISTAN INSTITUTE OF DEVELOPMENT ECONOMICS, ISLAMABAD

## CERTIFICATE

### DEDICATION

This is to certify that this thesis entitled “**Determinants of Stock Price Synchronicity**” submitted by **Ms. Adeeba Abid** is accepted in its present form by the Department of Economics and Finance, Pakistan Institute of Development Economics (PIDE) Islamabad as satisfying the requirements for partial fulfillment of the Degree of Master of Philosophy in Economics and Finance.

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## **DEDICATION**

I dedicate this thesis to Our Beloved Prophet Muhammad (PBUH). The noblest person the world has ever seen. And to my affectionate parents, who taught me the first word to speak, the first alphabet to write, the first step to take. Also to my Brother and Sister, those who lived in my mind, in my heart, in whole span of my life, and are nearest, dearest, deepest to me.

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## LIST OF ABBREVIATIONS

<b>KSE</b>	Karachi Stock Exchange
<b>EMH</b>	Efficient Market Hypothesis
<b>CAPM</b>	Capital Asset Pricing Model
<b>GDP</b>	Gross Domestic Product
<b>SYNCH</b>	Stock Price Synchronicity
<b>SIZE</b>	Firm Size
<b>LEVG</b>	Leverage
<b>PROF</b>	Profitability
<b>OWN</b>	Ownership Pattern
<b>LIQ</b>	Liquidity
<b>ILIQ</b>	Illiquidity
<b>IND</b>	Industries
<b>ROA</b>	Return on Asset
<b>D/E</b>	Debt to Equity



## **ABSTRACT**

This study analyzes the firm specific determinants of stock price synchronicity in Pakistan for the period of 2005 to 2015. For this purpose balanced panel firm specific data of 100 non financial firms are used. The results indicate that the firm size, liquidity and illiquidity are significantly affecting stock price synchronicity and these factors are considered as firm specific determinants of synchronization. For large firms asymmetric information reduces so these firms move with market encounter high value of  $R^2$ . Impact of liquidity is positive on stock price synchronicity. When there is noise behind shares trading, firm experiences high stock price synchronization. But illiquidity negatively affects synchronization. Trading of shares in small number is responsible for low stock price synchronicity across firms. That means firms incorporate firm specific information in share prices. Furthermore, there is no impact of ownership pattern on stock price synchronicity. Result of industry effect reports that stock price synchronicity differ among industries

Keywords: Stock Price Synchronicity, Firm Size, R-square, Liquidity, Ownership Pattern, Industry Effect.

## CHAPTER I

### INTRODUCTION

Stock markets are considered to be the primary indicator of country's development and economic strength. Stock market is the place that works as resource allocation mechanism by including market level, industry level and firm level information in stock prices. Stock markets are highly responsive to market news. Stock prices go up or down when good or bad news strikes the market. As a result, individual stocks may co-move with stock markets. The recent discussion in the field of asset pricing is stock price synchronicity and there is no consensus on the definition of stock price synchronicity. Roll (1988) describes stock price synchronicity measures the level up to which stock prices commove with market and it depends on the relative amounts of firm specific information and market wide information capitalization in stock prices. Morck *et al* (2000) defines stock price synchronicity as a process in which prices go up and down with market. Skaife *et al.* (2006) describes stock price synchronicity as a measure of the amount of firm-specific information impounded in stock prices. Zhang and Niu (2015) define stock price synchronicity as degree of convergence between company's stock price fluctuation and market price fluctuation. Thus it's not an easy task to define stock price synchronicity.

According to Morck *et al.* (2000) stock prices in emerging markets are more synchronized. Study of Morck *et al.* (2000) motivate to study this concept for Pakistan market that is also an emerging market. Factors behind high synchronicity in emerging markets are:

- There is poor corporate transparency.
- There are not many rules and enforcing policies about information disclosure.
- Most of the companies are family owned or group affiliated so difficult to collect reliable information of these companies.

Stock price synchronicity is used to determine the level to which changes in a firm's share price are due to firm specific information or due to market wide information. Stock prices differ with both market and industry returns (Kings 1966). The remaining factor that is not explained by market and industry return, is expected to be explained by events specific to firm (Cyert, Moyer, & Chapman, 1967; Williams, 1967). Roll (1988) finds weak role of market and industry information capitalization in stock prices. When stock price synchronicity is higher then there are more chances that market would explain the specific trend in stock prices. A measure that is used to study stock price synchronicity is R square statistic from market model. High R square from asset pricing model indicates market level information is impounded in stock prices and low R square indicates that firm specific information is impounded in stock prices.

Some scholars use noise term to explain stock price synchronicity. Noise means price goes up or down without any underline driver and fundamental factors. Shiller (1981) argues that the presences of excessive volatility in stock prices are due to noises that are ignored. This is also supported by West (1988) who document that most of private stock volatilities are due to noises of moods of investors, market bubbles and so on. Barberies (2005) find that stock price synchronicity is due to noise. Li (2014) document that synchronicity is due noise. Market gives the reason of noise in such a way that there is asymmetry of information in market so some investors have more

information and some have less. Hence, activities of less informed investors in market create noise.

Demirag (2003) document that most of the Turkish companies are family owned. As a result, risk of asymmetric information increases for outside investors. In emerging markets like Pakistan most of the companies are family owned and have poor corporate governance. Thus, investors are unable to collect reliable information of these companies. Generally it is observed that firm that follows family ownership pattern have high R square.

Liquidity in stock market is defined as the presence of buyer and seller. Some scholars argue that stocks with higher synchronicity having higher liquidity. Chan *et al.* (2008) find that there is positive relationship between  $R$  square and firm value. They also document that high  $R$  square reflects market wide information relative to firm specific information. Market makers can be more dependent on market information if  $R$  square is high. Eventually, adverse selection risk for market makers reduces when they make trading with informed traders. By use of three liquidity measures the study provides empirical evidence that stock with higher  $R$  square have higher liquidity.

From all above discussion it's concluded that there is no unanimity between its interpretation and explanation of  $R$ - square. Pakistani market is an emerging market so interest of investors is increasing in this market to study the behavior of  $R^2$ . High and low  $R^2$  is related to company specific variables. There are different attributes of company specific variables but here question arises that which variables are contributing  $R$ -square. To the best of our knowledge no study is available in literature that study stock price synchronicity in Pakistan in this context. Therefore present

research work is an effort to study this phenomenon for Pakistan market and try to explore firm specific determinants of stock price synchronicity.

### **1.1 Research Gap:**

Available literature did not provide consensus on the definition of stock price synchronicity that stock price represents firm specific information, market wide information and industry level information. All discussion on literature did not provide consensus that differences in R square or synchronicity across the firms are due to firm specific information, property rights, uniformed traders, noise in returns, size of firm ,legal regimes and also no document on why R square of firms are high and low . Pakistan is an emerging market and no study explored stock price synchronicity is high or low and its conflicting views. This study is an effort to bridge this gap and extract any first hand information about stock price synchronicity.

### **1.2 Research Questions:**

Following questions are developed through the available literature on related study.

1. Whether size of the company has influence on stock price synchronicity?
2. Whether leverage of the company influences stock price synchronicity?
3. Whether ownership pattern has influence on stock price synchronicity?
4. Whether profitability has influence on stock price synchronicity?
5. Whether liquidity exerts influence on stock price synchronicity?
6. Whether stock price synchronicity is same across industries?

### **1.3 Research Objectives:**

The overall objective of this dissertation is to analyze firm specific determinants of stock price synchronicity. More specifically the objectives of this thesis are:

- a. To provide insight about the firm specific determinants of stock price synchronicity.
- b. To explore the differences in stock price synchronicity associated with ownership pattern.
- c. To explore the role of liquidity in explaining the stock price synchronicity.
- d. To compare stock price synchronicity across industries.

#### **1.4 Significance of the Study:**

This work would enhance the existing literature in several ways.

1. Theory behind stock price synchronicity is market efficiency. According to that theory information is priced in market. But question arises whether firm specific information or market average information is priced. Literature provides no clear consensus on this question.
2. Pakistan is an emerging market where closed corporate governance system is followed. There is less focus on stock market, uniqueness of features and no research work, Pakistan supports to explore such type of markets.
3. Whether the behavior of family and non family owned business is same or different. When investors go for selection of companies they decide what kind of model should be adopted for particular company. We would check whether market supports the argument that family owned businesses are hesitant to disclose company specific information so R square of such firm/companies is high.
4. Price of stock should be considered in turnover not in isolation. If price of stock moving up and down and stock is frequently traded then in market it's representing sentiments of buyer and seller. If only stock prices of untraded

stock moving up and down then that change is meaningless. Hence, we would check liquidity and stock price synchronicity support each other.

### **1.5 Plan of the Study:**

Chapter 1 is the introductory part of the study. Rest of the study is structured as follows. Chapter 2 is about theoretical background, literature review and research hypothesis. Chapter 3 describes estimation models, variables definition and data description. In Chapter 4 reports estimation results of particular study. In chapter 5 conclusion and policy recommendation are developed.

## **CHAPTER II**

### **LITERATURE REVIEW**

#### **2.1 Theoretical Background:**

Economist Eugene Fama developed this theory in 1970. This theory explores all the available market information that would benefit investors without the increase in transaction cost. His theory of efficient market is that it's impossible for investors to do better than the market because all accessible information is already put together in stock prices. Efficient market hypothesis is categorized into three categories: "weak, semi strong and strong form". The weak form of EMH argues that the prices of publicly traded assets reveal all accessible information and past prices are not that much important for the prediction of future movements. The semi strong hypothesis argues that the prices are efficient so with little change in information they respond to that news or changes immediately. The strong form of EMH argues that the prices reflect both the public information and private insider information. Individual's stock prices impound market level, industry level and firm specific information in prices supported by market efficiency theory. Fama (1991) put forth "efficient market theory" and argue that stock prices reflected all the available information in efficient capital market. This result was based on hypothesis that investors in efficient market identify useful information and then made sound investment decision. When information reaches toward investors they respond accordingly. This information can be firm specific or market specific. If there is firm specific information, stock prices would deviate from market and firms experience low R-square. But if information is



market specific then stock prices would align with the market movement. Thus, such kind of information could be used by investors.

## **2.2 Literature Review:**

Regarding synchronization there are two types of discussion in finance. one school of thought which is supported by Scheffler and Vishni. They argue that factors like size, market to book ratio and liquidity are anomalies because these factors arise due to market inefficiency. Other school of thought which is supported by Fama and French they argue that these factors capture extra market risk which market is unable to capture. This risk is systematic risk .So these factors are not anomalies and should be incorporated in estimation equation. If R Square from market model regression is low then we are in favour of fama and French argument which means that investors are making decision on the basis of firm specific factors like size, ROA etc. If R Square from market model regression is high then we support Scheffler and Vishni argument. There is controversy among both school of thoughts, one is taking these factors as anomalies and other as extra risk premium.

Morck *et al.* (2000) are the one who recommend R square as a measure of stock price synchronicity and document that the stock prices in emerging markets or poor economies are more synchronous. To measure stock price synchronicity of 40 countries they used bi weekly return data. They found negative relationship of stock price synchronicity with country geographical size and positive relationship with earning co-movements and GDP growth. They advocate that smaller countries are having more stock price synchronicity because of small country effect. They also argue that sudden changes in monetary policy and high inflation results in unstable financial markets. They conclude that strong property rights assist informed arbitrages

which reflect firm specific information in prices and results in lower stock price synchronicity.

Piotroski and Roulstone (2004) study how informed traders like financial analyst, institutional investors and insiders effect the incorporation of firm level, market level and industry level information. Along with other variables, type of industry is selected independent variable to study the influence of three informed trader's activities on stock prices. Results show positive link of synchronicity with analyst forecasting activities and negative with insiders. They find that inclusion of informed trader in market effects stock price synchronicity.

Durnev *et al.* (2004) find that firms make efficient investment when there are lower R square values as the less asymmetric information improves the link between firms and capital suppliers. They used R square measure to study firm specific return variation. Size, leverage, liquidity, R&D expense, and some other variables are picked as independent variables.

Barberis *et al.* (2005) find that market frictions and noise trader sentiment are the reason for the changes in R square of firms which are added or deleted in S&P 500 index.

Skaife *et al.* (2006) document five different analyses on equity market data of Australia, France, Germany, Japan, UK and the USA. They argue that R square is unable to represent firm specific information in stock prices internationally so they proposed zero return days metric to capture firm specific information and findings are also consistent with this view. They find significant linkage between information proxies and zero return days metric.

Chan and Hameed (2006) investigate the relationship between stock price synchronicity and analyst activity in emerging markets. R square measure is applied in this study. Synchronicity and size is used as control variables. They find that greater analyst coverage is responsible for higher stock price synchronicity. After controlling the role of firm size on lead lag relation they document the returns on high analyst following portfolio lead returns on low analyst following portfolio. They also find that stock price synchronicity decreases when earning forecast dispersion is high.

Jin and Myer (2006) studied the link between stock price synchronicity and measures of corporate transparency. They employed R square measure for synchronicity. They found that more firm specific information is disclosed to outside investors if information environment is more transparent. Hence, market wide information explains less variation in returns and derives low stock price synchronicity.

Peng *et al.* (2006) look at determinants of  $R^2$ . When investors react rationally to firm specific information,  $R^2$  doesn't decrease.  $R^2$  decreases when investors overreact to firm specific information. Based on this theoretical explanation they empirically test the relationship between  $R^2$  and investor overreaction (price momentum) and find negative relationship.

Chung *et al.* (2007) studied the effect of investor protections, R square and systematic risk of CECFs (close end country funds). First, finding is that the countries of English origin having lower stock price synchronicity and systematic risk as compare to countries of French or German origin which show that stock price synchronicity and systematic risk of CECFS changes across these institutional factors. Second finding is that the investor protection levels have negative impact on systematic risk of CECFs and stock price synchronicity.

Haggard *et al.* (2008) documented whether voluntary disclosure affects stock prices and stock price crashes or not? They used Morck *et al.* (2000) definition of synchronicity. They found that more disclosure results in lower stock price synchronicity and stock price crashes. Because more firm specific information is available to outside investors so insider investors should face less firm specific risk.

Khandaker and Heaney (2008) studied 41 countries to find that the emerging economies have more stock price synchronicity. Low synchronicity is observed in transparent economies (Australia and Germany). They also documented that stock price synchronicity is higher in post communist group than the common and civil law country group. Additionally, emerging financial and emerging post communist countries show more stock price synchronicity.

Khanna and Thomas (2008) documented the link between control groups, various interlocks of firms and synchronicity in Chile. They found that firm returns are synchronous when there are interlocking directorates in firms. They documented a positive link between synchronicity and interlock directors even the effect of common business group is controlled. Findings provide evidence that shared directors play a major role in Chilean markets and existence of shared directors is related with increased connection in firm fundamentals and less firm transparency.

Shaiban and Saleh (2010) documented the role of financial intermediaries like financial analysts on stock price synchronicity. They find a positive relation between stock price synchronicity and analyst forecasting activities. Because through intraday information transfer, analysts increase market information in prices. They also find that more disclosure lessens the relationship between stock price synchronicity,

analysts forecasting activities and help to identify firm specific component of future earnings.

Dasgupta *et al.* (2010) document stock price synchronicity increases with more transparent environment of firm. This study uses firm size, leverage, market to book ratio, ROA and  $\beta$  as firm control variables. Results show that market to book ratio and leverage is having negative effect while large size,  $\beta$  and higher profitability (ROA) having positive effect on stock price synchronicity. When more firm specific information is available, market participants better predict the arrival of future firm specific event. As a result less new information is impounded in stock prices. Hence when transparency gets better,  $R^2$  can increase.

Khander (2011) studies three developed and eight emerging countries. He used voice and accountability as a two corporate governance mechanism that are associated with R square values. Results show that high stock price synchronicity in emerging countries is due to low corporate governance, high inflation and country geographical size.

Chan *et al.* (2013) documented two hypothesis to study the effect of stock return synchronicity and liquidity. Relative synchronicity hypothesis shows positive relationship between stock return synchronicity and liquidity as all the three illiquidity measures (bid ask spread, price impact and Amihud illiquidity) increases with stock return co-movement. According to absolute hypothesis, stock illiquidity falls with systematic volatility and rises with idiosyncratic volatility. Additionally effect of stock price synchronicity on liquidity is more for non S&P 500 stocks .Because of greater information asymmetry for non S&P 500 stocks.

Hasan *et al.* (2014) selected china that makes efforts for betterment of property rights, law enforcement and liberalization of political institution across different provinces. They documented that when there is institutional development in connection with property rights protection and rule of law than stock price synchronicity reduces. Further investigation reveals that stock price synchronicity reduces when there is more political pluralistic regime. Thus, it reduces uncertainty and government intervention .As a result firm specific information increases. They find that coefficient of size (control variable) is positive because stocks of large firms moves with market and the coefficient leverage is positive because process of collection of private firm information is expensive for the firms having more risk of financial distress. But both of these variables are statistically insignificant.

Zhang and Niu (2015) documented the effect of accounting rules, accounting standards and voluntary information disclosure on stock price synchronicity. This study used opaque as an explanatory variable to measure voluntary information disclosure. They empirically found that more voluntary information would decrease stock price synchronicity. Variable of profitability measure (ROA) is insignificant and sign of liquidity measure (Turn over) is according to expectation.

Gassen *et al.* (2016) documented that difference in liquidity is responsible for different  $R^2$ -values across the countries. Liquidity is measured by zero return day frequency and synchronicity by R-sqaure from market model regression. They document the negative relationship of synchronicity with illiquidity and positive relationship with size.

Tas and Tan (2016) include CEO duality, corporate governance, foreign ownership ratio, board independence and board size to study stock price synchronicity in Borsa,

Istanbul and Turkey.  $R^2$  value is higher in Turkey which shows that the stock prices not impounded firm specific information. They find negative relation between foreign ownership and stock price synchronicity as the ratio of foreign ownership increases stock prices reflect more firm specific information. Negative relationship is also observed between board independence and synchronicity measure because of inclusion of independent directors in board improves information environment of firms. They find positive association between leverage, volume and stock price synchronicity. Results suggest that foreign ownership, board independence and good corporate governance explain the incorporation of firm specific information in stock prices.

Zhang *et al.* (2016) investigates  $R^2$  and idiosyncratic volatility are not interchangeable proxies for firm specific variation in returns especially in China due to short selling mechanism. Further they find that idiosyncratic volatility can be used as proxy for the firms of improved information environment and when firm information environment is deteriorated both proxies can be used.

Zou *et al.* (2017) investigates stock price synchronicity at firm level from the role of foreign qualified institutional investors in Chinese stock market. They are of view that foreign ownership, large shareholdings, institutional ownership and audit quality have influence on firm specific information. Results support the view that stocks invested by institutional investors and foreign qualified institutional investors face low stock price synchronicity. They picked firm leverage, MB, ROA, ROE, size and volume as control variables. They empirically found negative coefficients of all variables. Negative coefficients of size signals that firm with small size have more ability to reflect market than large firms. Negative coefficient of leverage signals that more levered firms are required to disclose more information.

Most of the prior literature has mainly focused on information based explanation of synchronicity and on country specific factors that effects stock price synchronicity. In above review, variables like GDP per capita, country size, corporate transparency, inflation, voice and accountability are used for country level explanation of stock price synchronicity. Literature on firm specific determinants that affects stock price synchronicity is scanty. Consistency with Alves et al. (2008)  $R^2$  is still a puzzle. Because literature does not clearly explain what factors causes stock price synchronicity. Another gap of the existing literature is that they did not study this phenomenon for Pakistan so our understanding about the stock price synchronicity and firm specific determinants is incomplete.

### **2.3 Research Hypothesis:**

It is hypothesized that larger firms are linked with better information environments so indicating negative relationship between  $R^2$  and firm size. Stocks of larger firms incorporate more market wide information than those of smaller firms that results in positive association. There is positive association between leverage and  $R^2$  because cost of collecting private information may be higher for the firms with more risk of leverage or financial distress. Negative relationship between leverage and  $R^2$  is observed as firms with high leverage having less chances to follow synchronized behavior in term of prices. Family owned businesses are hesitant to disclose firm specific information so there is positive association. When volatility of firm's profitability (ROA) increases than firms performance is not correlated with market. More trading represents more incorporation of market information in share prices so firms observes positive association between Liquidity (turnover) and  $R^2$ . There is mixed evidence so association can also be negative. The main objective of this study



is to find firm specific determinants of stock price synchronicity. Keeping in mind this objective hypothesis are:

1. Size of the company is positively associated with company's information environment.
2. High leverage is associated with low stock price synchronicity.
3. Family Ownership is positively associated with stock price synchronicity.
4. Profitability of the company influences stock price synchronicity.
5. Stock market liquidity significantly influences stock price synchronicity.
6. Stock price synchronicity has industry specific effect.

## CHAPTER III

### METHODOLOGICAL FRAMEWORK

This chapter presents an overview of the models specification followed by sample selection, data sources, definitions of variables and estimation technique.

#### 3.1 Regression Model:

Estimation is two step process .In first step daily data of market prices and KSE 100 Index is chosen. Then Market model (CAPM) is applied in which firms returns are regressed on market return and annual values of  $R^2$  is calculated. Whole process is repeated every year. In second step panel data analysis is performed on selected variables. There are many firms' specific factors that influence stock price synchronicity so more widely discussed factors are expressed.

#### 3.2 Balanced Panel Data Model:

Panel data set is balanced because sample set have constant T for all cross-sectional units. Simple linear model is estimated by three methods: (1) Common Coefficient /Pooled OLS Model (2) Fixed Effect Model (3) Random Effect Model.

#### 3.3 Common Coefficient Model:

Here model estimates common intercept  $\beta_0$  for all cross sections.

Equation of Common coefficient is:

$$\begin{aligned} SYNCH_{it} = & \beta_0 + \beta_1 SIZE_{it} + \beta_2 LEVG_{it} + \beta_3 PROF_{it} + \beta_4 OWN_{it} + \beta_5 LIQ_{it} \\ & + \beta_6 IND_{it} + \epsilon_{it} \end{aligned}$$

Dependent variable is stock price synchronicity (SYNCH) where Size, Leverage (LEVG), profitability (PROF), ownership pattern (OWN), liquidity (LIQ) and industry (IND) are independent variables respectively. Where  $i=1, 2, \dots, N$  is number of firms and  $t=1, 2, \dots, T$  is number of time period. This model estimates common intercept  $\beta_0$  for all the cross-sections. It implies that there are no differences between estimated cross-sections.

### 3.4 Fixed Effect Model:

In this model intercept terms vary over the firms. Therefore fixed effect is used to explore the possibility of this fixed cross section specific intercept.

Equation of Fixed Effect is:

$$SYNCH_{it} = \beta_0 + \beta_1 SIZE_{it} + \beta_2 LEVG_{it} + \beta_3 PROF_{it} + \beta_4 OWN_{it} + \beta_5 LIQ_{it} + \beta_6 IND_{it} + d_i + \varepsilon_{it}$$

This model considers each intercept as cross- section or group specific. It estimates different intercepts for each section or group. Intercept may vary across cross section but does not vary over time.

Decision between Common Coefficient Model and Fixed Effect Model is to be taken by Fixed Effect Redundant test or Maximum likelihood ratio test. Test statistic for likelihood ratio is

$$\xi_{LR} = 2[\text{Log}L(\hat{\beta}) - \text{Log}L(\tilde{\beta})]$$

Where  $\hat{\beta}$  is unrestricted maximum likelihood estimator and  $\tilde{\beta}$  is constrained maximum likelihood parameter. And maximize the log likelihood function with restriction that is  $R\beta = q$ . If the difference  $[\text{Log}L(\hat{\beta}) - \text{Log}L(\tilde{\beta})]$  is smaller than restriction is correct and if difference is large than restriction is incorrect.

### 3.5 Random Effect Model:

Intercept is random for each group. Therefore random effect is used to explore the possibility of this random intercepts for each group. This model considers intercepts for each cross- section or group as random parameters. Equation of random effect is:

$$\begin{aligned} SYNCH_{it} = & \beta_0 + \beta_1 SIZE_{it} + \beta_2 LEVG_{it} + \beta_3 PROF_{it} + \beta_4 OWN_{it} + \beta_5 LIQ_{it} \\ & + \beta_6 IND_{it} + \mu_{it} \end{aligned}$$

Variability of intercept for each group or section can be attained through:

$$\beta_0 = \beta + v_i$$

After substitution final form of random model equation is:

$$\begin{aligned} SYNCH_{it} = & \beta + \beta_1 SIZE_{it} + \beta_2 LEVG_{it} + \beta_3 PROF_{it} + \beta_4 OWN_{it} + \beta_5 LIQ_{it} \\ & + \beta_6 IND_{it} + (v_i + \mu_{it}) \end{aligned}$$

Where  $v_i$  is zero, it means standard random variable.

Hausman test is used for the decision of appropriate model between Common Coefficient Model and Fixed Effect Model.

Test statistic for Hausman test is:

$$H_0 = (\hat{\beta}^{FE} - \hat{\beta}^{RE}) [VAR(\hat{\beta}^{FE}) - VAR(\hat{\beta}^{RE})]^{-1} (\hat{\beta}^{FE} - \hat{\beta}^{RE}) \sim X^2(k)$$

If statistic value is large, then reject null hypothesis so it means fixed effect model is appropriate otherwise Random effect model.

### 3.6 Least Square Dummy Variable Analysis:

Least square dummy variable analysis is used to study the impact of family and non family owned companies on synchronization and across industries stock price

synchronicity differs or not. Here intercept is about ownership pattern and industry related respectively. Equation is:

$$SYNCH_{it} = \beta_0 + \beta_1 SIZE_{it} + \beta_2 LEVG_{it} + \beta_3 PROF_{it} + \beta_4 OWN_{it} + \beta_5 LIQ_{it} + \beta_6 IND_{it} + d_i + \epsilon_{it}$$

In case of industry effect  $d=1$  if firm pertains to specific industry otherwise  $d=0$ . In case of family owned and non family owned companies  $d=1$  if firms belong to family owned companies otherwise  $d=0$ .

### 3.7 Variables Definitions:

#### 3.7.1 Dependent Variable:

This study uses R square measure proposed by Morck et al. (2000). This measure is capable to capture firm level information in share prices. In literature R square is commonly used measure for synchronicity.

Consistent with Roll (1988) and Morck et al. (2000) this study will find R square by Market model (CAPM) that regress firms return on market return.

$$RET_{it} = \alpha_{0,i} + \alpha_{1,i} RETMKT_t + \epsilon_{it}$$

Where  $RET$  is the firm's  $i$  returns for  $t$  period,  $RETMKT$  is market return for  $t$  period,  $\epsilon_{it}$  is the error term and  $\alpha_{0,i}$  and  $\alpha_{1,i}$  are regression parameters. Roll (1988) observes that market model regression (CAPM) yields low explanatory power and that's not the weakness of model. Decline in explanatory power is due to incorporation of private or firm specific information in to prices.

R square from market model (CAPM) regression cannot be used as dependent variable as it is constrained with bounded range  $[0, 1]$ . This study uses Morck et al.

(2000) definition of stock price synchronicity in which they apply logistic transformation to create continuous variable and now the range of variable is unbounded  $[+\infty, -\infty]$ .

$$SYNCH_{it} = \log\left(\frac{R^2}{1 - R^2}\right)$$

$SYNCH_{it}$  is the  $i^{th}$  firm stock price synchronicity for period t and  $R^2$  is the result of market model regression. Morck et al. (2000), Piotroski & Roulstone, (2004) and Zhang & Niu (2015) incorporates Synchronicity as dependent variable.

### **3.7.2 Independent Variables:**

Detail of all independent variables is as follow:

#### **SIZE:**

Firm size is measured by log of Market value of equity. It is defined as:

Size = Log (Numbers of shares x Market price of the shares).

Durnev, Morck & Yeung (2004), Piotroski & Roulstone, (2004), Chan and Hameed (2006), Skaife (2006), Dasgupta et al. (2010), Hasan et al. (2014) use variable of Firm size. It is hypothesized that there is positive significant relationship between firm size and stock price synchronicity.

#### **LEVERAGE:**

Leverage of firms is measured by debt to equity ratio. It is defined as:

Lev = (Total Liabilities / Total Assets)

Variable of leverage is studied in Durnev, Morck & Yeung (2004), Dasgupta et al. (2010), Hasan et al. (2014) and Tas and Tan (2016). It is hypothesized that there is negative (positive) association between stock price synchronicity and leverage.

### **PROFITABILITY:**

Profitability of the firms is measured by ROA and is defined as:

$$\text{ROA} = (\text{Net Income} / \text{Total Assets})$$

Skaife et al. (2006) and Zhang & Nui (2015), Dasgupta et al. (2010) use ROA for profitability measurement.

### **OWNERSHIP PATTERN:**

Ownership pattern is interpreted as family owned companies and non family owned companies. Dummy is used for this variable  $d=1$  if firms are from family owned companies otherwise  $d=0$ . Family owned is defined as:

$$\text{FO} = (\text{Percentage of Shares Held By Family})$$

And Non-family owned is defined as:

$$\text{NFO} = (\text{Percentage of the Shares that are Not Held By Family})$$

Tas and Tan (2016) used foreign ownership ratio and found that it is negatively correlated with stock prices. The study documented that in future work effect of family ownership on stock price synchronicity be studied. Therefore, this study explained ownership pattern that is defined as family owned companies and non family owned companies.

## **LIQUIDITY:**

Liquidity of the firms is measured by Turnover ratio and illiquidity by Zero Trading Days. Turnover ratio is defined as:

Turnover Ratio = (Number of Shares Traded/ Total Outstanding Shares)

And Illiquidity is defined as:

Zero Return Days = (Number of Zero-Return Trading Days / Total Trading Days)

Where zero return trading days are those days in which price of share is same as to previous day price. Skaife et al. (2006) use zero return metric. Skaife et al. (2006) and Zhang & Nui (2015) use turnover for the measurement of liquidity. From literature there exist a positive association between liquidity and stock price synchronicity but there is negative association of illiquidity with stock price synchronicity.

## **INDUSTRY EFFECT:**

Industry effect is proxy by dummy variable. Where  $d=1$  if firm belongs to specific industry otherwise  $d=0$ .

### **3.5 Data Description:**

Sample is the representative of population. Sample consists of 100 non financial companies. As the largest or top companies represent 88% of stock market which is more than the required representation of sample. These companies are selected on basis of their market capitalization. Financial companies are not used because of capital structure and closing period problem. Annual data from July 2005 to June 2015 is used for the analysis. Sample starts from 2005 because in Pakistan ownership pattern reporting is started in 2005. Stocks data is collected from Karachi Stock



Exchange and company specific data is collected from annual report of the firm or from balance sheet of Pakistan published by state bank. For analysis of industry effect 25 sectors are selected and one sector is used as reference industry that is textile spinning .Distribution of industries is presented in below table.

**Table 1: Industries Distribution**

Sr.No	Sectors	Number of Companies
1	CEMENT	11
2	OIL GAS MARKETING	4
3	OIL GAS EXPLORATION	4
4	POWER AND GENERATION	7
5	PHARMA	3
6	CHEMICAL	4
7	REFINARY	4
8	TEXTILE COMPOSITE	12
9	TECHNOLOGY	2
10	FOOD AND PERSONAL CARE	8
11	TRANSPORT	1
12	CABLE	2
13	ENGINEERING	3
14	AUTOMOBILE ASSEMBLER	3
15	PAPER AND BOARD	3
16	AUTOMOBILE PARTS & ASSEMBLERS	4
17	MISCALLENOUS	3
18	VANASPATI	2
19	TOBACCO	1
20	GLASS AND CREMICS	3
21	SYYNTHETIC AND REYON	2
22	TEXTILE WEAVING	2
23	WOLLEN	1
24	SUGAR AND ALLIED INDUSTRIES	2

## CHAPTER IV

### MODEL ESTIMATION AND RESULTS

After the selection of suitable specification of the model, we now empirically analyze the firm specific determinants of stock price synchronicity. The first section 4.1 deals with the descriptive Statics while the table 2 reports correlation among variables. Results of panel data analysis on cross section and period are discussed in section 4.2 and 4.3 . In table 4 and table 6 Redundant fixed effect test helps to identify appropriate model out of common coefficient model and fixed effect model and Hausman test for the selection of appropriate model out of fixed effect model and random effect model. Section 4.4 and 4.5 studies the impact of ownership pattern and industry effect on stock price synchronicity.

#### 4.1 Descriptive Statistics:

The statistical characteristics of the data are explored by using descriptive statistics. The results of mean, median, maximum, minimum, standard deviation, skewness, kurtosis, Jarque Bera are reported in Table 1.

**Table 2: Descriptive Statistics**

	<b>SYNC</b>	<b>PROF</b>	<b>SIZE</b>	<b>ILIQ</b>	<b>LEV</b>	<b>LIQ</b>
<b>Mean</b>	-3.467900	0.087439	7.019711	55.78800	1.246751	890.5106
<b>Median</b>	-2.843259	0.070000	7.055031	18.50000	0.023105	122.1141
<b>Maximum</b>	1.463649	3.026000	13.79922	249.0000	269.5550	49728.07
<b>Minimum</b>	-16.61199	-1.961000	0.746688	0.000000	-0.314933	0.000000
<b>Std. Dev.</b>	2.677802	0.182716	2.191673	68.62198	9.399377	3123.304
<b>Skewness</b>	-1.292140	3.738341	0.008389	1.106447	24.65688	9.776795
<b>Kurtosis</b>	5.261901	102.0713	2.982370	2.944235	678.8519	125.4390
<b>Jarque-Bera</b>	491.4459	411293.0	0.024681	204.1670	19133649	640568.5
<b>Probability</b>	0.000000	0.000000	0.987735	0.000000	0.000000	0.000000

Average profit of firm is 8.7%.Maximum profit earned by firm is 302% and minimum loss incurred by the firm is 196%.Average standard deviation is 18.2% per year. On average there are 55 days in which no trading occurs. Maximum zero trading days for firm is 249 days and minimum days of zero trading is zero. Average variation in zero trading days is 68 days. Results reveal that synchronicity is negatively skewed whereas size, profitability, leverage, liquidity and illiquidity are positively skewed. Average leverage of firm is 124%.Maximum and minimum leverage for firm is 269% and 31% respectively. Per year variation in leverage is 94%.Average turnover ratio (liquidity) is 890%.Maximum turnover of firm is 49728 times and minimum value of turnover is 0 times. Standard variation for firm turnover is 3123 times per year. Kurtosis values of firm size and firm illiquidity are closer to 3 it means that firms are mesokurtic whereas synchronicity, profitability, leverage, liquidity and illiquidity have kurtosis values greater than 3 so it means these firms are leptokurtic. Probability value of Jarque Bera statistics is less than 5% except the firm size .All values are non-normal except size of firm.

Table 2 reports the results of correlation analysis.

**Table 3: Correlation Matrix**

	<b>SYNC</b>	<b>PROF</b>	<b>SIZE</b>	<b>LIQ</b>	<b>LEV</b>	<b>LIQ</b>
<b>SYNC</b>	1.000000	0.060054	0.275883	-0.622582	0.030305	0.192149
<b>PROF</b>	0.060054	1.000000	0.187230	-0.021702	-0.070773	-0.027474
<b>SIZE</b>	0.275883	0.187230	1.000000	-0.232727	0.045362	0.038258
<b>LIQ</b>	-0.622582	-0.021702	-0.232727	1.000000	-0.012478	-0.205083
<b>LEV</b>	0.030305	-0.070773	0.045362	-0.012478	1.000000	0.012578
<b>LIQ</b>	0.192149	-0.027474	0.038258	-0.205083	0.012578	1.000000

No higher correlation is observed between liquidity and illiquidity so both can be used in panel data analysis. Significant negative correlation is observed between size and

illiquidity. However no correlation is observed between other independent variables. Therefore, no problem of multicollinearity exists.

#### 4.2 Panel Data Analysis: (Cross section Effect)

This study applies pooled regression, fixed effect model and random effect model. Maximum likelihood test is used to identify appropriate model out of pooled and fixed effect and then Hausman test is used to identify the appropriate model between fixed effect and random effect. The results of redundant fixed effect test and Hausman test is reported in Table 3.

**Table 4: Redundant fixed effect test and Hausman test**

<b>Redundant Fixed Effects Test</b>	Statistic	Probability
	2.436	0.000
<b>Hausman Test</b>	Chi-Sq. Statistic	Probability
	49.869	0.000

To choose appropriate model out of pooled and fixed effect Maximum likelihood test is used. Result of maximum likelihood shows that the P-value of cross section Chi-square is significant so rejecting null hypothesis and fixed effect model is appropriate model in cross section. To choose the appropriate model out of fixed effect and random effect Hausman Test is used. Result of Hausman test shows that P-value of cross random test is significant so rejecting null hypothesis. Appropriate model between fixed effect and random effect is fixed effect model. Hence from both Likelihood and Hausman test, Fixed Effect Model is appropriate model in cross section.

**Table 5: Panel Data Analysis (Cross Section)**

	Common Coefficient Model			Fixed Effect Model cross section			Random Effect Model cross section		
Variables	Coefficients	t-stat	P-value	Coefficients	t-stat	P-value	Coefficients	t-stat	P-value
Constant	-3.449	-14.098	0.0000	-2.531	-8.59	0.0000	-3.175	-12	0.0000
ROA	0.377	-1.035	0.3011	0.28	-0.404	0.4884	0.327	-0.893	0.3719
Lnsiz	0.163	-5.228	0.0000	-0.021	-0.532	0.5951	0.116	-3.559	0.0004
Iliq	-0.022	-22.56	0.0000	-0.015	-9.441	0.0000	-0.021	-19.222	0.0000
D/E	0.005	-0.737	0.4615	0.006	-0.885	0.3763	0.005	-0.813	0.4165
Liq	0.00005	-2.785	0.0055	0.00003	-1.224	0.2214	0.00005	-2.356	0.0187
	<b>Adjusted R-Square</b>	<b>F-statistic</b>	<b>Prob(F-statistic)</b>	<b>Adjusted R-Square</b>	<b>F-statistic</b>	<b>Prob(F-statistic)</b>	<b>Adjusted R-Square</b>	<b>F-statistic</b>	<b>Prob(F-statistic)</b>
	0.408	138.811	0.000	0.299	86.271	0.000	0.482	9.948	0.000

### 4.3 Interpretation of Fixed Effect model in Cross Section:

Table 4 shows the results of cross section panel data analysis. Results of fixed effect model shows that the coefficients of ROA (Profitability), Lnsiz (Firm Size), D/E (Leverage) and Liq (Liquidity) are insignificant at 5% level of significance which means synchronicity is not affected by these firm specific factors. Coefficient of Illiq (illiquidity) is significant and negative as there p-value is less than 5% .It has negative impact on stock price synchronicity. This result is consistent with Skaife et al. (2006) .They document two reasons for negative relation. Firstly, when number of zero return day increases, number of observations in estimated equation decreases. Explanatory power of model fall and lower R square value is observed. Secondly, shares are traded in small amount and occasionally. When stocks are illiquid then they are less likely to move with market as a result synchronicity decreases. Explanatory power of the model is 29.91% that's mean approximately 30% of variation in dependent variable can be explained with the help of given variables. Probability of F-statistic is indicating that overall model is well specified.

### 4.4 Panel Data Analysis: (Period Effect)

The results of Redundant fixed effect test and Hausman test is reported in table 5.

**Table 6: Redundant fixed effect test and Hausman test**

<b>Redundant Fixed Effects Tests</b>	Statistic	Probability
	12.958	0.000
<b>Hausman Test</b>	Chi-Sq. Statistic	Probability
	98.893	0.000

To choose appropriate model out of pooled and fixed effect Maximum likelihood test is used. Result of maximum likelihood shows that the P-value of period Chi-square is significant so rejecting null hypothesis and fixed effect model is appropriate model in period. To choose the appropriate model out of fixed effect and random effect

Hausman Test is used. Result of Hausman test shows that P-value of period random test is significant so rejecting null hypothesis. Appropriate model between fixed effect and random effect is fixed effect model. Hence from both Likelihood and Hausman test, Fixed Effect Model is appropriate model in period.

**Table 7: Panel Data Analysis (Period)**

Variables	Common Coefficient Model			Fixed Effect Model (Period)			Random Effect (Period)	
	Coefficients	t-stat	P-value	Coefficients	t-stat	P-value	Coefficients	t-stat
Constant	-3.449	-14.098	0.0000	-4.214	-14.042	0.0000	-3.511	-14.042
ROA	0.377	-1.035	0.3011	0.374	-1.066	0.2865	0.381	-1.035
Lsize	0.163	-5.228	0.0000	0.274	-7.184	0.0000	0.172	-5.628
Iliq	-0.022	-22.56	0.0000	-0.022	-21.24	0.0000	-0.022	-21.24
D/E	0.005	-0.737	0.4615	0.002	-0.322	0.7473	0.005	-0.737
Liq	0.00005	-2.785	0.0055	0.00004	-1.987	0.0472	0.00005	-2.785
	<b>Adjusted R-Square</b>	<b>F-statistic</b>	<b>Prob(F-statistic)</b>	<b>Adjusted R-Square</b>	<b>F-statistic</b>	<b>Prob(F-statistic)</b>	<b>Adjusted R-Square</b>	<b>F-statistic</b>
	0.408	138.811	0.0000	0.466	63.273	0.0000	0.412	140.7

#### 4.5 Interpretation of Fixed Effect model in Period:

Table 6 reports the results of period panel data analysis .Results of fixed effect model shows that coefficients of ROA (Profitability), and D/E (Leverage) are insignificant as there P-values are greater than 5% which means synchronicity is not affected by these firm specific factors. Coefficient of Lsize (Firm

Size) is significant and positive at 5% level of significance. Result is consistent with study of Piotroski and Roulstone (2004), Chan and Hameed (2006) , Skaife et al (2006) and Dasgupta et al. (2010) .Their argument that large firms have more media exposure, indicates market as most important indicators and aligns with the interest of investors so such kind of firms move with market. Stocks of large firms incorporate more market wide information that results in higher synchronization. The similar result indicates that in Pakistan large firms have more information related to the market so there exists a positive impact. Coefficient of Iliq (illiquidity) is negative and significant at 95% level of significance. Coefficient of liq (liquidity) is positive and significant. This result is supported by Skaife et al. (2006). They document that because of increase in uniformed trading of shares, positive association exists. Liquid stocks move with market as a result firm’s experience high stock price synchronicity. Explanatory power of the model is 46.60% that’s mean approximately 46.6% variation in dependent variable can be explained by given independents variables. Probability of F-statistic is indicating that overall model is well specified.

#### 4.6 Ownership Pattern and Stock Price Synchronization:

**Table 8: Impact of Ownership Pattern on Stock Price Synchronicity**

<b>Variables</b>	<b>Coefficients</b>	<b>t-statistics</b>	<b>Probability</b>
Constant	-3.428339	-13.84227	0.0000
ROA	0.367781	-1.007325	0.3140
LNSIZE	0.163162	-5.23059	0.0000
LIQ	0.0000608	-2.829179	0.0048
D_E	0.005055	-0.725468	0.4683
ILIQ	-0.02254	-22.52991	0.0000
FO-NFO	-0.087	-0.555	0.5788
	<b>Adjusted R-squared</b>	<b>F-statistic</b>	<b>Prob(F-statistic)</b>
	0.408	115.647	0.0000



Table 7 reports the results of Impact of ownership pattern on stock price synchronization. Family ownership is captured by using dummy variable. Coefficient of family ownership is negative and insignificant at 5% level of significance. Its reveals that the synchronization is not different across family owned companies and non family owned companies. Explanatory power of the model is 40.77% it means approximately 41% variation in stock price synchronicity can be explained with the help of select independent variables. Probability of F-statistic is indicating that overall model is well specified.

#### 4.7 Industry Effect:

**Table 9: Industry Effect on Price Synchronization**

<b>Variables</b>	<b>Coefficients</b>	<b>t-statistics</b>	<b>Probability</b>
<b>Constant</b>	-3.585	-10.929	0.000
ROA	0.180	-0.468	0.640
LIQ	0.000	-2.304	0.021
LNSIZE	0.077	-2.229	0.026
ILIQ	-0.020	-16.852	0.000
D_E	0.006	-0.940	0.347
AUTOMOBILE_ASSEMBLER	0.248	-0.579	0.562
AUTOMOBILE_PARTS__ASSEM	0.312	-0.819	0.412
CABLE	0.075	-0.152	0.879
CEMENT	1.472	-5.055	0.000
CHEMICAL	0.283	-0.751	0.453
ENGINEERING	0.972	-2.282	0.022
FOOD_AND_PERSONAL_CARE	0.038	-0.126	0.899
GLASS_AND_CREMICS	-0.220	-0.523	0.601
MISCALLENOUS	-0.488	-1.155	0.248
OIL_GAS_EXPLORATION	2.366	-5.810	0.000
OIL_GAS_MARKETING	2.063	-5.221	0.000
PAPER_AND_BOARD	0.460	-1.082	0.279
PHARMA	0.035	-0.083	0.933
POWER_AND_GENERATION	0.819	-2.514	0.012
REFINERY	1.390	-3.554	0.0004
WOLLEN	0.530	-0.799	0.424
VANASPATI	1.079	-2.151	0.032
TRANSPORT	1.263	-1.891	0.059

TOBACCO	1.072	-1.537	0.124
TEXTILE_WEAVING	0.248	-0.501	0.616
TEXTILE	0.215	-0.778	0.436
TECHNOLOGY	0.439	-0.852	0.394
SYNTHETIC_AND_REYON	0.398	-0.813	0.416
SUGAR_AND_ALLIED_INDUSTR	-0.082	-0.166	0.868
	<b>Adjusted R-squared</b>	<b>F-statistic</b>	<b>Prob(F-statistic)</b>
	0.452	29.436	0.000

Table 8 reports the results of least square dummy variable analysis that is performed to explore the difference between synchronization across industries. Coefficients of cement, engineering, oil gas & marketing, oil gas & exploration, power& generation, refinery and vanaspti industries are positive and significant. All the mentioned industries have higher synchronicity as compared to reference industry (Textile Spinning) .Coefficients of remaining industries are insignificant, indicating that these industries have no difference with reference industry that is textile spinning. Hence, it is concluded that industry effect exists and across industries stock price synchronicity differs. Explanatory power of the model is 45.22% that means 45% variation in dependent variable can be explained by given independent variables Probability of F-statistic is indicating that overall model is well specified.

## CHAPTER V

### CONCLUSION

Roll (1998) first time study this concept. Find that the share prices behavior not only depends on market information but also on firm specific information. After 2013 this topic gets more attention of researchers. As until that period there was no consensus on the definition, interpretation and determinants of stock price synchronicity. Study of Morck (2000) encourages to explore emerging market and Pakistan market is an emerging market. This study tries to study firm specific determinants of synchronization of share prices. Study uses data of 100 non financial companies from 2005-2015. The main objective of the study is to empirically analyze the firm specific fundamentals of stock price synchronicity. In study synchronicity is dependent variables and firm size, profitability, leverage, liquidity, illiquidity and ownership pattern are firm specific variables.

Estimation involves two phases. In first phase, daily data of KSE 100 index and share prices are used to calculate R square from market model regression. Applies logistic transformation to make range of variable unbounded. High  $R^2$  shows more incorporation of market level information in share prices and low  $R^2$  represents more firm specific information. In second phase, Panel data is performed for both cross section effect and period effect. Data set is balanced. Three techniques of panel data analysis are used. Common coefficient model is applied first then fixed effect model. Likelihood test reports that fixed effect model is best model out of pooled model and fixed model. And result of hausman test again refers that for analysis fixed effect model is best model out of fixed effect model and random effect model. Significant variable in fixed effect model (cross section effect) is illiquidity. Its negative sign

reveals that thinly traded shares do not move with market. In fixed effect model (period effect) significant variables are firm size, liquidity and illiquidity. Firm size is significant as large firms are part of index. When market moves, firms share prices respond accordingly. Thus, there is possibility of higher stock price synchronicity among large stocks and markets. Illiquidity again has negative impact on synchronization. This study also shows that liquidity is significant firm specific determinant of stock price synchronization. Up to some extent determinant behind the price of each stock is buyer and seller. When there are more buyers and sellers of certain stock that stock is more liquid. If a price of such stocks moves up and down then the change in prices is meaningless and it shows the sentiments of both buyers and sellers. Hence, trend of liquid stocks and market are same and shares impound market level information in their share prices.

Dummy variable is used to study the difference on stock price synchronicity due to ownership. Result report that there is no difference in synchronization. Least square dummy variable analysis is used for industry effect. Results shows only cement, engineering, oil gas & marketing, oil gas & exploration, power & generation, refinery and vanaspti industry outperform the textile spinning industry which is picked as reference industry. For this reason, it is confirmed that stock price synchronization varies across industries.

### **5.1 Policy Recommendation:**

Several policy implications can be drawn from above results. Stock prices movement is important for investors. If investors know that company is responding on firm specific information they would align their investment strategies according to firm fundamentals. Similarly if company is moving with market so they would make their investments decisions in the response of market. They should be careful about firm

size, liquidity and illiquidity while making investment decisions Small firms are not part of index so asymmetry of information exists. Investors should make their investments according to the behavior of large firms because large firms commove with market. And they should not only consider price change of stocks but also consider their volume which means that the stock is liquid or illiquid. If stock is illiquid it is not necessary that stock behavior is consistent with market. Here more preference is on stock specific information and market overall trend is not aligned with that. Thus, investors should be vigilant about the investment in such kind of stocks.

## **5.2 Future Research:**

Further study can also be extended to explore the relationship between corporate governance and stock price synchronicity.

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